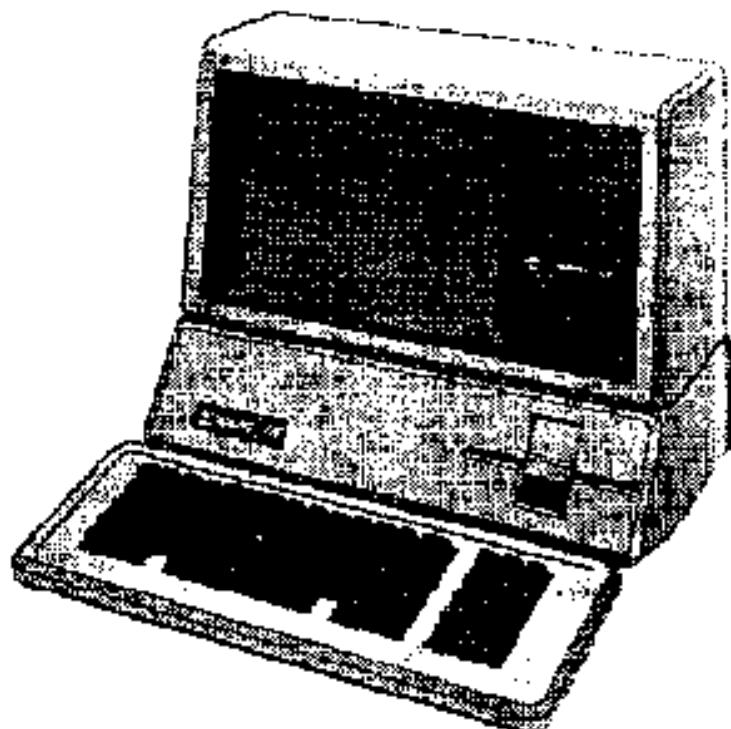




Apple /// Computer Technical
Information

Apple /// Serial Printer Port Driver 1.30 Source Code Listing



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FORMATTED LISTING

```
; #####PROJECT : Apple /// SOS Serial Printer Driver 1.30 (6502 Assembly Source Code)
; # FILE NAME: SERPRINT.text
; #####
000001      .TITLE      "SOS Serial Printer Driver"
000002      .NOPATCHLIST
000003      .NOMACROLIST
000004
000005 ;-----
000006 ;
000007 ;      SOS Serial Printer Driver
000008 ;
000009 ;      Copyright (C) 1983 by Apple Computer Inc.
000010 ;      All Rights Reserved
000011 ;
000012 ;
000013 ;      Revisions:
000014 ;
000015 ;      1.00  14-Nov-80
000016 ;
000017 ;      1.10  14-Apr-81
000018 ;      Bug fixes:
000019 ;      Switch to 1 MHz for all ACIA references.
000020 ;      Check buffer count and delay count for write completion.
000021 ;
000022 ;      1.30  05-Jan-83
000023 ;      Bug fixes:
000024 ;      Add XMIT flag for improved communications between Driver
000025 ;      and Interrupt Handler.
000026 ;
000027 ;-----
000028
000029 DEVTYPE      .EQU      41
000030 SUBTYPE      .EQU      01
000031 APPLE         .EQU      0001
000032 RELEASE       .EQU      1300
000033 .PAGE
000034 ;-----
000035 ;
000036 ;      The macro SWITCH performs an N way branch based on a switch index. The
000037 ;      maximum value of the switch index is 127 with bounds checking provided
000038 ;      as an option. The macro uses the A and Y registers and alters the C,
000039 ;      Z, and N flags of the status register, but the X register is unchanged.
000040 ;
000041 ;      SWITCH [index], [bounds], adrs_table, [*]
000042 ;
000043 ;      index  This is the variable that is to be used as the switch index.
000044 ;      If omitted, the value in the accumulator is used.
000045 ;
000046 ;      bounds  This is the maximum allowable value for index. If index
000047 ;      exceeds this value, the carry bit will be set and execution
000048 ;      will continue following the macro. If bounds is omitted,
000049 ;      no bounds checking will be performed.
000050 ;
000051 ;      adrs_table This is a table of addresses (low byte first) used by the
000052 ;      switch. The first entry corresponds to index zero.
000053 ;
000054 ;      *  If an asterisk is supplied as the fourth parameter, the
000055 ;      macro will push the switch address but will not exit to
000056 ;      it; execution will continue following the macro. The
000057 ;      program may then load registers or set the status before
000058 ;      exiting to the switch address.
000059 ;
000060 ;-----
000061 ;
000062 .MACRO      SWITCH
000063 .IF        "%1" <> ""
000064 LDA         %1
000065 .ENDC
000066 .IF        "%2" <> ""
000067 CMP         #%2+1
000068 BCS         $3579
000069 .ENDC
000070 ASL         A
000071 TAY
000072 LDA         %3+1,Y
000073 PHA
000074 LDA         %3,Y
000075 PHA
000076 .IF        "%4" <> "*"
000077 RTS
000078 .ENDC
000079 $3579
000080 .PROC      SERPRNT
000081 .WORD      0FFFF
000082 .WORD      66.
000083 .ASCII      "Serial Printer Driver -- "
000084 .ASCII      "Copyright (C) 1983 by Apple Computer Inc."
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000085
000086 ;-----
000087 ;
000088 ; Device Handler Identification Block
000089 ;
000090 ;-----
000091
000092 IDBLK .WORD 0000 ;Link to next device handler
000093 .WORD SP_MAIN ;Entry point address
000094 .BYTE 8 ;Length of device name
000095 .ASCII ".PRINTER" "
000096 .BYTE 80,00,00 ;Device, Slot & Unit numbers
000097 .BYTE DEVTYPE
000098 .BYTE SUBTYPE
000099 .BYTE 00
000100 .WORD 0000
000101 .WORD APPLE
000102 .WORD RELEASE
000103
000104
000105 ;-----
000106 ;
000107 ; Device Handler Configuration Block
000108 ;
000109 ;-----
000110
000111 .WORD 05 ;Configuration block length
000112 DRATE .BYTE 08 ;Data Rate
000113 DFORMAT .BYTE 22 ;Data Format
000114 CRDELAY .BYTE 00 ;Carriage return delay
000115 LFDELAY .BYTE 00 ;Line feed delay
000116 FFDELAY .BYTE 00 ;Form feed delay
000117 .PAGE
000118 ;-----
000119 ;
000120 ; SOS Global Data & Subroutines
000121 ;
000122 ;-----
000123
000124 ALLOCSIR .EQU 1913
000125 DEALCSIR .EQU 1916
000126 SYSERR .EQU 1928
000127
000128
000129 ;-----
000130 ;
000131 ; SOS Error Codes
000132 ;
000133 ;-----
000134
000135 XREQCODE .EQU 20 ;Invalid request code
000136 XCTLCODE .EQU 21 ;Invalid control/status code
000137 XNOTOPEN .EQU 23 ;Device not open
000138 XNOTAVIL .EQU 24 ;Device not available
000139 XNORESRC .EQU 25 ;Resource not available
000140 XBADOP .EQU 26 ;Invalid operation for device
000141
000142
000143 ;-----
000144 ;
000145 ; Hardware I/O Addresses
000146 ;
000147 ;-----
000148
000149 ACIADATA .EQU 0C0F0 ;ACIA data register
000150 ACIASTAT .EQU 0C0F1 ;ACIA status register
000151 ACIACMD .EQU 0C0F2 ;ACIA command register
000152 ACIACTL .EQU 0C0F3 ;ACIA control register
000153 E_REG .EQU 0FFDF ;Environment register
000154 B_REG .EQU 0FFE0 ;Bank register
000155
000156
000157 ;-----
000158 ;
000159 ; Miscellaneous Equates
000160 ;
000161 ;-----
000162
000163 TRUE .EQU 80
000164 FALSE .EQU 00
000165 ASC_LF .EQU 0A
000166 ASC_FF .EQU 0C
000167 ASC_CR .EQU 0D
000168 BITON4 .EQU 10
000169 BITON7 .EQU 80
000170 .PAGE
000171 ;-----
000172 ;
000173 ; SOS Device Handler Interface
000174 ;
000175 ;-----
000176
000177 SOSINT .EQU 0C0

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000178 REQCODE .EQU SOSINT+0 ;SOS request code
000179 BUFFER .EQU SOSINT+2 ;Buffer pointer
000180 REQCNT .EQU SOSINT+4 ;Requested count
000181 CTLSTAT .EQU SOSINT+2 ;Control/status code
000182 CSLIST .EQU SOSINT+3 ;Control/status list pointer
000183
000184
000185 ;-----
000186 ;
000187 ; Zero Page Storage
000188 ;
000189 ;-----
000190
000191 ZPGSAVE .EQU SOSINT+0A ;Saved zero page storage
000192
000193 ZPGTEMP .EQU ZPGSAVE+00 ;Temporary zero page storage
000194 MOVCNT .EQU ZPGTEMP+00
000195
000196
000197 ;-----
000198 ;
000199 ; Private Variable Storage
000200 ;
000201 ;-----
000202
000203 SIRADDR .WORD SIRTABLE
000204 SIRTABLE .BYTE 1,0 ;ACIA resource
000205 .WORD ACIAMIH
000206 MIHBANK .BYTE 0
000207 SIRCOUNT .EQU *-SIRTABLE
000208 OPENFLG .BYTE FALSE ;Device open flag
000209 XMIT .BYTE FALSE ;XMIT in progress flag
000210 DLYCNT .BYTE 0 ;Delay count for MIH
000211 BUFCNT .BYTE 0 ;Local buffer byte count
000212 BUFHEAD .BYTE 0 ;Local buffer head index
000213 BUFTAIL .BYTE 0 ;Local buffer tail index
000214 BUFSIZE .EQU 110. ;Local buffer size
000215 LOCBUF .EQU * ;Local buffer
000216 .ASCII "Copyright (C) 1983 by Apple Computer Inc."
000217 CPYRGHTSIZ .EQU *-LOCBUF
000218 .BLOCK BUFSIZE-CPYRGHTSIZ,0
000219 .PAGE
000220 ;-----
000221 ;
000222 ; Serial Printer Driver -- Main entry point
000223 ;
000224 ;-----
000225
000226 SP_MAIN .EQU *
000227 SWITCH REQCODE,8,SP_REQSW
000228
000229
000230 BADREQ LDA #XREQCODE ;Invalid request code
000231 JSR SYSERR
000232
000233
000234 NOTOPEN LDA #XNOTOPEN ;Device not open
000235 JSR SYSERR
000236
000237
000238 SP_REQSW .EQU * ;Serial Printer request switch
000239 .WORD SP_READ-1
000240 .WORD SP_WRITE-1
000241 .WORD SP_STAT-1
000242 .WORD SP_CNTL-1
000243 .WORD BADREQ-1
000244 .WORD BADREQ-1
000245 .WORD SP_OPEN-1
000246 .WORD SP_CLOSE-1
000247 .WORD SP_INIT-1
000248 .PAGE
000249 ;-----
000250 ;
000251 ; Serial Printer Driver -- Initialization Request
000252 ;
000253 ;-----
000254
000255 SP_INIT .EQU *
000256 LDA #FALSE
000257 STA OPENFLG
000258 LDA DRATE ;Validate data rate
000259 AND #00F
000260 STA DRATE
000261 TAX
000262 LDA DFORMAT ;Validate data format
000263 AND #0EE
000264 ORA #010
000265 CPX #03 ;If data rate is 110 baud
000266 BNE $010
000267 ORA #080 ; force two stop bits
000268 $010 STA DFORMAT
000269 CLC
000270 RTS

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000271          .PAGE
000272 ;-----
000273 ;
000274 ;  Serial Printer Driver -- Open Request
000275 ;
000276 ;-----
000277
000278 SP_OPEN    .EQU    *
000279     BIT    OPENFLG      ;Serial Printer open?
000280     BPL    $010        ;  No
000281     LDA    #XNOTAVIL
000282     JSR    SYSERR
000283
000284 $010      LDA    B_REG
000285     AND    #0F
000286     STA    MTHBANK    ;Set interrupt handler bank
000287     LDA    #SIRCOUNT
000288     LDX    SIRADDR
000289     LDY    SIRADDR+1
000290     JSR    ALLOCSIR   ;Allocate the ACIA
000291     BCS    $020
000292
000293     LDA    #FALSE
000294     STA    XMIT
000295     JSR    CNTL00    ;Set up ACIA
000296     LDA    #TRUE
000297     STA    OPENFLG   ;Set serial printer open
000298     RTS
000299
000300 $020      LDA    #XNORESRC
000301     JSR    SYSERR
000302          .PAGE
000303 ;-----
000304 ;
000305 ;  Serial Printer Driver -- Close Request
000306 ;
000307 ;-----
000308
000309 SP_CLOSE   .EQU    *
000310     ASL    OPENFLG      ;Serial Printer open?
000311     BCS    $010        ;  Yes
000312     JMP    NOTOPEN
000313
000314 $010      BIT    XMIT      ;Wait for write completion
000315     BMI    $010
000316     PHP
000317     SEI
000318     LDA    E_REG
000319     TAX
000320     ORA    #BITON7
000321     STA    E_REG      ;Switch to 1 MHz
000322     STA    ACIASTAT   ;Reset the ACIA
000323     STX    E_REG
000324     PLP
000325     LDA    #SIRCOUNT
000326     LDX    SIRADDR
000327     LDY    SIRADDR+1
000328     JSR    DEALCSIR   ;Deallocate the ACIA
000329     RTS
000330     .PAGE
000331 ;-----
000332 ;
000333 ;  Serial Printer Driver -- Read Request
000334 ;
000335 ;-----
000336
000337 SP_READ    .EQU    *
000338     BIT    OPENFLG      ;Serial Printer open?
000339     BMI    $010
000340     JMP    NOTOPEN
000341 $010      LDA    #XBADOP
000342     JSR    SYSERR
000343     .PAGE
000344 ;-----
000345 ;
000346 ;  Serial Printer Driver -- Write Request
000347 ;
000348 ;-----
000349
000350 SP_WRITE   .EQU    *
000351     BIT    OPENFLG
000352     BMI    $010
000353     JMP    NOTOPEN
000354 $010      LDA    #BUFSIZE/2      ;Set MOVCNT to the lesser
000355     LDY    REQCNT+1    ;  of BUFSIZE/2 and REQCNT.
000356     BNE    $020
000357     CMP    REQCNT
000358     BCC    $020
000359     LDA    REQCNT
000360     BNE    $020
000361     RTS
000362 $020      STA    MOVCNT   ;Count = zero -- all done!
000363

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000364      LDA      BUFFER+1      ;Check for buffer
000365      CMP      #0FF          ; address overflow
000366      BCC      $030
000367      SBC      #080
000368      STA      BUFFER+1
000369      INC      1401+BUFFER
000370
000371      $030      SEC
000372      LDA      #BUFSIZE
000373      SBC      MOVCNT
000374      $040      CMP      BUFCNT      ;Wait for room in buffer
000375      BCC      $040
000376
000377      LDY      #0
000378      LDX      BUFTAIL
000379      $050      LDA      (BUFFER),Y      ;Move data to local buffer
000380      STA      LOCBUF,X
000381      INX
000382      CPX      #BUFSIZE
000383      BCC      $060
000384      LDX      #0
000385      $060      INY
000386      CPY      MOVCNT
000387      BCC      $050
000388      STX      BUFTAIL
000389
000390      PHP
000391      SEI      ;Shut down interrupts
000392      CLC
000393      LDA      BUFCNT
000394      ADC      MOVCNT      ;Bump buffer count
000395      STA      BUFCNT
000396
000397      BIT      XMIT      ;Already transmitting?
000398      BVS      $070          ; Yes
000399      LDA      #0C0
000400      STA      XMIT      ;Set transmitting flag
000401      LDA      E_REG
000402      PHA
000403      ORA      #BITON7      ;Switch to 1 MHz
000404      STA      E_REG
000405      LDY      ACIASTAT      ;Fake an interrupt to start
000406      JSR      ACIAMIH      ; the interrupt handler.
000407      PLA
000408      STA      E_REG      ;Switch back to 2 MHz
000409      $070      PLP
000410
000411      CLC
000412      LDA      BUFFER
000413      ADC      MOVCNT      ;Fix up buffer pointer
000414      STA      BUFFER
000415      BCC      $080
000416      INC      BUFFER+1
000417
000418      $080      SEC
000419      LDA      REQCNT
000420      SBC      MOVCNT      ;Fix up requested count
000421      STA      REQCNT
000422      BCS      $010
000423      DEC      REQCNT+1
000424      JMP      $010      ;Loop back for more
000425      .PAGE
000426 ;-----
000427 ;
000428 ; ACIA Master Interrupt Handler
000429 ;
000430 ;-----
000431
000432      ACIAMIH      .EQU      *
000433      LDA      E_REG
000434      ORA      #BITON7      ;Set 1 MHz mode
000435      STA      E_REG
000436
000437      TYA
000438      AND      #60          ;Check DSR and DCD status
000439      BNE      $080          ; bits for printer hand shake
000440
000441      TYA
000442      AND      #BITON4      ;Check transmit register
000443      BEQ      $060          ; empty status bit
000444
000445      LDA      DLYCNT      ;Any transmit delay in progress?
000446      BEQ      $010          ; no
000447      DEC      DLYCNT
000448      JMP      $060
000449
000450      $010      LDA      BUFCNT      ;Any data to transmit?
000451      BEQ      $070          ; no -- wait for completion
000452      LDX      BUFHEAD
000453      LDA      LOCBUF,X
000454      STA      ACIADATA      ;Transmit one character
000455      INX
000456      CPX      #BUFSIZE

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000457      BCC      $020
000458      LDX      #0
000459 $020      STX      BUFHEAD
000460      DEC      BUFCNT
000461
000462      CMP      #ASC_CR      ;Check for any delay
000463      BEQ      $040
000464      BCS      $060
000465      CMP      #ASC_LF
000466      BNE      $030
000467      LDA      LFDELAY
000468      BCS      $050
000469 $030      CMP      #ASC_FF
000470      BNE      $060
000471      LDA      FFDELAY
000472      BCS      $050
000473 $040      LDA      CRDELAY
000474 $050      STA      DLYCNT
000475      .PAGE
000476 $060      LDA      ACIACMD
000477      AND      #0E0      ;Enable transmit interrupt
000478      ORA      #007
000479      STA      ACIACMD
000480      RTS
000481
000482 $070      ASL      XMIT
000483      BMI      $060      ;Still not done
000484
000485 $080      LDA      ACIACMD
000486      AND      #0E0      ;Disable transmit interrupt
000487      ORA      #00B
000488      STA      ACIACMD
000489      RTS
000490      .PAGE
000491 ;-----
000492 ;
000493 ; Serial Printer Driver -- Status Request
000494 ;
000495 ;-----
000496
000497 SP_STAT      .EQU      *
000498      BIT      OPENFLG      ;Serial Printer open?
000499      BMI      $010
000500      JMP      NOTOPEN
000501 $010      SWITCH      CTLSTAT,2,STATSW
000502
000503
000504 BADCTL      LDA      #XCTLCODE      ;Invalid control code
000505      JSR      SYSERR
000506
000507
000508 STATSW      .WORD      STAT00-1
000509      .WORD      STAT01-1
000510      .WORD      STAT02-1
000511
000512
000513 STAT00      RTS      ;0 -- NOP
000514
000515
000516 STAT01      LDY      #0      ;1 -- Status Table
000517      LDA      #0
000518      STA      (CSLIST),Y
000519      RTS
000520
000521
000522 STAT02      LDY      #0      ;2 -- New Line
000523      LDA      #FALSE
000524      STA      (CSLIST),Y
000525      RTS
000526      .PAGE
000527 ;-----
000528 ;
000529 ; Serial Printer Driver -- Control Request
000530 ;
000531 ;-----
000532
000533 SP_CNTL      .EQU      *
000534      BIT      OPENFLG      ;Serial Printer open?
000535      BMI      $010      ; Ok
000536      JMP      NOTOPEN
000537 $010      SWITCH      CTLSTAT,2,CNTLSW
000538      JMP      BADCTL
000539
000540 CNTLSW      .WORD      CNTL00-1
000541      .WORD      CNTL01-1
000542      .WORD      CNTL02-1
000543
000544 CNTL00      .EQU      *      ;0 -- Reset
000545 $010      BIT      XMIT      ;Wait for write completion
000546      BMI      $010
000547      LDA      #00
000548      STA      BUFHEAD
000549      STA      BUFTAIL

```



```
000550      PHP
000551      SEI
000552      LDA      E_REG
000553      TAX
000554      ORA      #BITON7
000555      STA      E_REG
000556      STA      ACIASTAT      ;Switch to 1 MHz
000557      LDA      DFORMAT      ;Reset ACIA
000558      AND      #0FO
000559      ORA      DRATE
000560      STA      ACIACTL      ;Set up ACIA control register
000561      LDA      DFORMAT
000562      ASL      A
000563      ASL      A
000564      ASL      A
000565      ASL      A
000566      ORA      #00B
000567      STA      ACIACMD      ;Set up ACIA command register
000568      STX      E_REG      ;Switch back to 2 MHz
000569      PLP
000570      RTS
000571
000572  CNTL01      .EQU      *      ;1 -- Serial Printer Status Table
000573      RTS
000574
000575  CNTL02      .EQU      *      ;2 -- New Line
000576      RTS
000577      .END
000578

; ##### END OF FILE: SERPRINT.text
; #  END OF FILE: SERPRINT.text
; #  LINES : 578
; #  CHARACTERS : 26582
; #  Formatter : Assembly Language Reformatter 1.0.2 (07 January 1998)
; #  Author : David T. Craig -- 71533.606@compuserve.com -- Santa Fe, New Mexico USA
; #####
```

##